Figure 1

1.1 $P = f\{ C, Y, T \}$ where C, Y, and T are variables endogenous to the security

P = Market Price
C = Cash Receipts, periodic coupon, dividend or premium payments
Y = Yield, a single term relating security's return, relative to P, C, T
T = Time, a terminal or continuous measure of the life of the security.

Figure 2

1.2 Yield M = $\dfrac{\sum (\text{Maturity} \times \text{Portfolio Coefficient} \times \text{YTM}), \text{for all issues}}{\sum (\text{Maturity} \times \text{Portfolio Coefficient}), \text{for all issues}}$

where Yield M = Governing Yield = Y
Maturity = Time = Maturity in Years
Portfolio Coefficient = Present Value, per issue/Present Value, $\sum$ issues
Present Value = Accrued Interest + (best bid Price × Face Value)
YTM = Yield-To-Maturity, a means providing yield respective time.

Figure 3

1.2d Yield Md = $\dfrac{\sum (\text{Duration} \times \text{Portfolio Coefficient} \times \text{YTM}), \text{for all issues}}{\sum (\text{Duration} \times \text{Portfolio Coefficient}), \text{for all issues}}$.

Figure 4

(Duration, modified annualized)

1.3 $K = \dfrac{-C}{Y^2}\left(1 - (1 + Y/2)^{-2T}\right) + \dfrac{C}{Y}(T + TY/2)^{-2T-1} - (T + TY/2)^{-2T-1}$

1.3w $K = \dfrac{-C}{Y^2} + \dfrac{C}{Y^2}(1 + Y/2)^{-2T} - (1 - C/Y)(T + TY/2)^{-2T-1})$

Figure 5

(Convexity)

1.4 $V = \dfrac{2C}{Y^3} - \dfrac{\frac{2C}{Y^3}}{(1+Y/2)^{2T}} - \dfrac{\frac{CT}{Y^2}}{(1+Y/2)^{2T+1}} - \dfrac{\frac{C}{Y^2}}{(T+TY/2)^{2T+1}} + \dfrac{(1+C/Y)(T^2+T/2)}{(T+TY/2)^{2T+2}}$

Figure 6

1.5 Portfolio Coefficient, for each Issue = $\text{Present Value}^{I}/\text{Present Value}^{P}$;

where 1.5a $\text{Present Value}^{I} = (\text{AI} + (\text{Bid Price} \times \text{Face Value}))$, for each Issue;
1.5b $\text{Present Value}^{P} = \sum (\text{AI} + (\text{Bid Price} \times \text{Face Value}))$, for all Issues.

Figure 7

1.6a $\text{Present Value}^{P} = \sum (\text{AI} + (\text{Bid Price} \times \text{Face Value})$, for all Issues;

1.6b $\text{Accrued Interest}^{P} = \sum$ Accrued Interest, AI, for all Issues;

1.6c $\text{Face Value}^{P} = \sum$ Face Value, for all Issues;

1.6d $\text{Implied Price}^{P} = (\text{Present Value}^{P} - \text{AI}^{P})/ \sum$ Face Value, for all Issues.

Figure 8

1.7a $C^{P} = \text{Cash Flow}^{P} = \sum C \times$ Portfolio Coefficient, for all Issues;

1.7b $T^{P} = \text{Time}^{P} = \sum$ Maturity $\times$ Portfolio Coefficient, for all Issues;

1.7c $Y^{P} = \text{Yield}^{P} = \sum$ Yield $\times$ Portfolio Coefficient, for all Issues.

Figure 9

1.8a $C^{P} = \text{Coupon}^{P} = \sum$ Coupon $\times$ Portfolio Coefficient, for all Issues;

1.8b $T^{P} = \text{Maturity}^{P} = \sum$ Maturity $\times$ Portfolio Coefficient, for all Issues;

1.8c $Y^{P} = \text{Yield}^{P} = \sum$ Yield $\times$ Portfolio Coefficient, for all Issues.

Figure 10

1.9a $\text{Duration}^{P} = \sum$ Duration $\times$ Portfolio Coefficient, for all Issues;

1.9b $\text{Convexity}^{P} = \sum$ Convexity $\times$ Portfolio Coefficient, for all Issues.

Figure 14

Portfolio Coefficient, for each Issue = Present Value^{I}/Present Value^{P};
Present Value^{I} = (AI + (Bid Price x FaceValue), for each Issue;
Present Value^{P} = Σ (AI+(Bid Price x Face Value), for all Issues

Face Value^{P} = Σ Face Value, for all Issues;
Present (Full) Value^{P} = Σ (AI + (Bid Price x Face Value), for all Issues;
Accrued Interest^{P} = Σ Accrued Interest, AI, for all Issues;
Implied Price^{P} = (Present Value^{P} – AI^{P})/ Σ Face Value for all Issues

C^{P} = Cash Flow^{P} = Σ C x Portfolio Coefficient, for all Issues;
T^{P} = Time^{P} = Σ Maturity x Portfolio Coefficient, for all Issues;
Y^{P} = Yield^{P} = Σ Yield x Portfolio Coefficient, for all Issues

Duration^{P} = Σ Duration x Portfolio Coefficient, for all Issues;
Convexity^{P} = Σ Convexity x Portfolio Coefficient, for all Issues

Figure 15

Aggregate Data Values for Portfolio

Date	3/22/96	4/3/96	4/25/96
Face Value^{P}	$510,000,000	$510,000,000	$510,000,000
Accrued Interest^{P}	$4,749,907	$5,387,107	$7,172,578
Present Value^{P}	$513,449,907	$513,848,982	$513,610,078
Implied Price^{P}	0.99745098	0.99698407	0.99301471
Portfolio Coefficient			
11/96	.1375888	.1377205	.138186
5/97	.1959174	.1961886	.196814
10/97	.0799234	.0798135	.196814
8/98	.2353559	.235331	.235427
3/99	.0779432	.077984	.077894
6/00	.1572929	.157415	.156749
2/01	.1159784	.115547	.114773
Coupon^{P}	5.680331%	5.680322%	5.667059%
Maturity^{P}	2.470660	2.437096	2.359601
YTM^{P}	5.730002%	5.755183%	5.859601%
Duration^{P}	2.222031	2.191867	2.130696
Convexity^{P}	7.847886	7.695562	7.389558

Figure 20

Convexity, V vs. Prior Art			
Date	3/22/96	4/3/96	4/25/96
Yield M^P	5.87129004%	5.89269332%	6.0661141%
YTM^P	5.73000157%	5.75518286%	5.8561971%
Yield M^P – YTM^P(bp spread)	0.14128852	0.13751046	0.2099176
$Coupon^P$	5.680330985%	5.680322119%	5.66705895%
$Maturity^P$	2.4706604	2.437096	2.359601
$Price^P$ (N/A for V)	99.745098	99.698407	99.301471
process determining Convexity, using above single aggregate C^P, Y^P, T^P values:			
V (1.4c, Yield M^P)	6.41019700	6.25535943	5.88053355
V (1.4c, YTM^P)	6.44053175	6.28389014	5.92058762
V (1.4cv, Yield M^P – YTM^P)	6.84893917	7.14436415	2.89621154
V (1.4cv, Yield M^P)	0.00404544	0.00396111	0.00360859
Prior Art (S.4, YTM^P)	6.05221587	5.91149933	5.60084222
Market Spot Yield	5.845%	5.875%	6.065%
Yield M – Zero Spot	0.026%	0.018%	0.001%

Figure 21

Period	3/22/96 - 4/3/96	4/3/96 - 4/25/96	3/22/96 - 4/25/96
δY	0.0002071580	0.0017921768	0.001968276
K	–2.25389446	–2.21483844	–2.25389446
V (1.4cv, b.p. spread)	6.84893917	7.14436415	6.84893917
V (1.4c, Yield M)	6.41019700	6.25535943	6.41019700
V (1.4cv, Yield M)	0.00404544	0.00396111	0.00404544
processing 1.10, estimated Δ Price = $(K \times \delta Y) + (0.5 \times V \times (\delta Y)^2)$:			
Actual Δ Price	–0.000466911	–0.003969363	–0.004436274
Est. Δ P (V=1.4cv, spread)	–0.000466766	–0.003957909	–0.004423097
Accuracy %	99.97%	99.71%	99.70%
Error %	0.03%	0.29%	0.30%
Est. Δ P (V=1.4c YieldM^P)	–0.000466775	–0.003959336	–0.004423869
Accuracy %	99.97%	99.75%	99.72%
Error %	0.03%	0.25%	0.28%

Figure 26A

1.2	Yield M =YM =	(sum{(Maturity*Portfolio Coefficient*YTM)$_1$, (M*PC*YTM)$_{2,\ldots}$})/ (sum{(Maturity*Portfolio Coefficient)$_1$, (M*PC)$_{2,\ldots}$})
1.2d	Yield Md =YMD =	(sum{(Duration*PC*YTM)$_1$, (D*PC*YTM)$_{2,\ldots}$})/ (sum{(Duration*Portfolio Coefficient)$_1$, (D*PC)$_{2,\ldots}$})

Figure 26B

1.3cw K semi-annual	= DPDY =	((-C/(Y^2))*(1–((1+(.5*Y))^(-2*T)))) +((C/Y)*((T+(.5*Y*T))^((-2*T) –1))) –((T+(.5*Y*T))^((-2*T) –1))
	where C and Y are decimal values, T=Maturity in years	
1.3cn K generalized	=BONK=	((-C/(Y^2))*(1–((1+(Y/N))^(-N*T)))) +(((C/Y) –1)*T*((1+(Y/N))^((-N*T)–1)))
	where N=n= # cash receipts per annum, e.g. semi-annual=2; T=Maturity in years and where BONK and DPDY not returning exact identical values for N=n=2	

Figure 26C

1.4cn V generalized	=BONV=	(((2*C)/(Y^3))*(1–(Y/N))^(-N*T)))) –((C/Y^2)*(2*T)*((1+(Y/N))^((-N*T) –1))) –(((C/Y) –1)*(((N*T)+1)*(T/N))*((1+(Y/N))^((-N*T) –2)))
	where N=n= # cash receipts per annum, e.g. semi-annual=2; T=Maturity in years	
1.4cv V spread-based, semi-annual	=VEXA=	(((2*C)/(Y^3)) –(((2*C)/(Y^3))*((1+(Y/2))^(-2*T))) –((C*T)/(Y^2))*((1+(Y/2))^((-2*T) –1)) –((C/(Y^2))*((T+(T*(Y/2)))^((-2*T) –1))) +((1+(C/Y))*((T^2)+(T/2))*((T+(T*(Y/2)))^((-2*T) –2))))/10000
	where e.g. Y=YieldM–YTM, Y expressed in decimal, i.e. if Y=0.14%=0.14	
1.4cvn V spread-based, generalized	=VEX=	(((2*C)/(Y^3)) –(((2*C)/(Y^3))*((1+(Y/N))^(-N*T))) –((C*T)/(Y^2))*((1+(Y/N))^((-N*T) –1)) –((C/(Y^2))*((T+(T*(Y/N)))^((-N*T) –1))) +((1+(C/Y))*((T^2)+(T/N))*((T+(T*(Y/N)))^((-N*T) –2))))/10000
	where e.g. Y = Yield M, Y expressed in decimal, i.e. if Y = 6.06% = 0.606	

Figure 26D

1.10c	generalized	ΔP = DELTAP = K*(CHY) + (0.5*V*(CHY^2))
and where ΔP = DELTAP = –abs(Duration1.3n)*(CHY)+(0.5*(Convexity1.4cvn)*(CHY^2))		

Figure 26E

1.11	universal	ΔP = DP = -abs(Duration)*(CHY)+(0.5*(Convexity)*(CHY^2))

Figure 39

Target Security, a U.S. Treasury Note, held to mature 5/15/99, as on April 3, 1996:

Maturity:	May 1999
Coupon:	6.75% per annum, semi-annual payments
Prices: Bid/Ask	102:07; 102:07 / 102:09; 102:11
Face Value:	$50 million
Best Price:	$51,140,625
Accrued Interest:	$1,300,205
Total Cost (P+AI):	$52,440,830
Duration (mod. ann.):	2.782972

Figure 40

	of Duration		
Target	2.7829	can be sold for $52,409,580	and bought for $52,440,830
REPS A	2.6104	can be sold for $52,383,749	and bought for $52,416,144
REPS B	2.8280	can be sold for $52,450,920	and bought for $52,450,977
REPS C	2.6038	can be sold for $52,351,321	and bought for $52,383,845

Figure 41

Arbitrage Opportunities

Buying	Selling	$ Arb. Differ.	Spread bp
Target	A	-31250	-0.0006
Target	B	-57081	-0.00109
Target	C	-89509	-0.00171
A	Target	-6564	-0.00013
A	B	34776	0.000663
A	C	-64823	-0.00124
B	Target	-41397	-0.00079
B	A	-67228	-0.00128
B	C	-99656	-0.0019
C	Target	25735	0.000491
C	A	-96	-1.8E-06
C	B	67075	0.00128

Sorted Arbitrage Opportunities

Buying	Selling	$ Arb. Diff.	Spread bp
C	B	67075	0.00128
A	B	34776	0.000663
C	Target	25735	0.000491
C	A	-96	-1.8E-06
A	Target	-6564	-0.00013
Target	A	-31250	-0.0006
B	Target	-41397	-0.00079
Target	B	-57081	-0.00109
A	C	-64823	-0.00124
B	A	-67228	-0.00128
Target	C	-89509	-0.00171
B	C	-99656	-0.0019

Figure 47

Scalar		Nominal $ Values					Adj $ 1972 Values				
Value $ Basis1972 CPI	Annual Year End Year End	Actual $B DepositsCl FDIC	Actual $B Catastroph Loss,PCS	Actual $B Net Deposi Loss	Actual $B Statutory L P/C Unden	Annual Year End Year End	Adj$ 1972 DepCl	Adj1972 $E CatLoss	Adj$1972 DepLoss	Adj $B Stat Loss Underwr
0.26699	12/31/96		7.35			12/31/96		1.962379		
0.275	12/31/95	0.632	8.335	0.332	14.2	12/31/95	0.1738	2.292125	0.0913	3.905
0.2875	12/31/94	1.236	17.045	0.636	19	12/31/94	0.35535	4.900438	0.18285	5.4625
0.2875	12/31/93	3.132	5.585	2.132	15.1	12/31/93	0.90045	1.605688	0.61295	4.34125
0.3	12/31/92	40.94	22.974	32.34	33.3	12/31/92	12.282	6.8922	9.702	9.99
0.3125	12/31/91	53.832	4.711	39.732	16.7	12/31/91	16.8225	1.472188	12.41625	5.21875
0.325	12/31/90	14.489	2.807	6.889	18.2	12/31/90	4.708925	0.912275	2.238925	5.915
0.3375	12/31/89	22.28	7.642	17.58	16.5	12/31/89	7.5195	2.579175	5.93325	5.56875
0.35	12/31/88	36.432	1.409	32.132	8.4	12/31/88	12.7512	0.49315	11.2462	2.94
0.3625	12/31/87	8.4	0.946	5.4	7.1	12/31/87	3.045	0.342925	1.9575	2.57375
0.375	12/31/86	7.057	0.871	4.057	13.7	12/31/86	2.646375	0.326625	1.521375	5.1375
0.3875	12/31/85	8.059	2.816	6.359	22.6	12/31/85	3.122863	1.0912	2.464113	8.7575
0.4	12/31/84	20.334	1.548	14.834	19.4	12/31/84	8.1336	0.6192	5.9336	7.76
0.425	12/31/83	5.442	2.255	3.242	11.1	12/31/83	2.31285	0.958375	1.37785	4.7175
0.4375	12/31/82	9.904	1.523	9.104	8.3	12/31/82	4.333	0.666313	3.983	3.63125
0.4625	12/31/81	3.826	0.714	3.756	4.5	12/31/81	1.769525	0.330225	1.73715	2.08125
0.5125	12/31/80	5.516	1.178	5.416	1.7	12/31/80	2.82695	0.603725	2.7757	0.87125
0.575	12/31/79	0.111	1.705		-0.02	12/31/79	0.063825	0.980375		-0.0115
0.6375	12/31/78	0.854	0.645		-2.5	12/31/78	0.544425	0.411188		-1.59375
0.6875	12/31/77	0.205	0.423		-1.9	12/31/77	0.140938	0.290813		-1.30625
0.7375	12/31/76	1.235	0.271		1.6	12/31/76	0.910813	0.199863		1.18
0.775	12/31/75	0.34	0.513		3.6	12/31/75	0.2635	0.397575		2.79
0.85	12/31/74	1.576	0.696		1.9	12/31/74	1.3396	0.5916		1.615
0.9375	12/31/73	0.971	0.375		-0.8	12/31/73	0.910313	0.351563		-0.75
1	12/31/72	0.02	0.214		-1.8	12/31/72	0.02	0.214		-1.8
	12/31/71	0.141	0.173		-1.4	12/31/71	0.141	0.173		-1.4
	12/31/70	0.052	0.45			12/31/70	0.052	0.45		
	12/31/69	0.04	0.256			12/31/69	0.04	0.256		
	12/31/68	0.023	0.134			12/31/68	0.023	0.134		
	12/31/67	0.011	0.327			12/31/67	0.011	0.327		
	12/31/66	0.104	0.111			12/31/66	0.104	0.111		
	12/31/65	0.044	0.694			12/31/65	0.044	0.694		
	12/31/64	0.023	0.196			12/31/64	0.023	0.196		
	12/31/63	0.023	0.034			12/31/63	0.023	0.034		
	12/31/62	0.003	0.197			12/31/62	0.003	0.197		
	12/31/61	0.009	0.184			12/31/61	0.009	0.184		
	12/31/60	0.007	0.129			12/31/60	0.007	0.129		
	12/31/59	0.003	0.048			12/31/59	0.003	0.048		
	12/31/58		0.025			12/31/58		0.025		
	12/31/57	0.011	0.073			12/31/57	0.011	0.073		
	12/31/56	0.011	0.072			12/31/56	0.011	0.072		
	12/31/55	0.012	0.095			12/31/55	0.012	0.095		
	12/31/54	0.001	0.299			12/31/54	0.001	0.299		
	12/31/53	0.044	0.089			12/31/53	0.044	0.089		
	12/31/52	0.003	0.024			12/31/52	0.003	0.024		
	12/31/51	0.003	0.017			12/31/51	0.003	0.017		
	12/31/50	0.006	0.231			12/31/50	0.006	0.231		
	12/31/49	0.006	0.022			12/31/49	0.006	0.022		
	12/31/48	0.01				12/31/48	0.01			
	12/31/47	0.007				12/31/47	0.007			
	12/31/46	0.001				12/31/46	0.001			
	12/31/45	0.006				12/31/45	0.006			
	12/31/44	0.002				12/31/44	0.002			
	12/31/43	0.012				12/31/43	0.012			
	12/31/42	0.017				12/31/42	0.017			
	12/31/41	0.03				12/31/41	0.03			
	12/31/40	0.144				12/31/40	0.144			
	12/31/39	0.161				12/31/39	0.161			
	12/31/38	0.062				12/31/38	0.062			
	12/31/37	0.033				12/31/37	0.033			
	12/31/36	0.028				12/31/36	0.028			
	12/31/35	0.013				12/31/35	0.013			
	12/31/34	0.002				12/31/34	0.002			

Figure 49

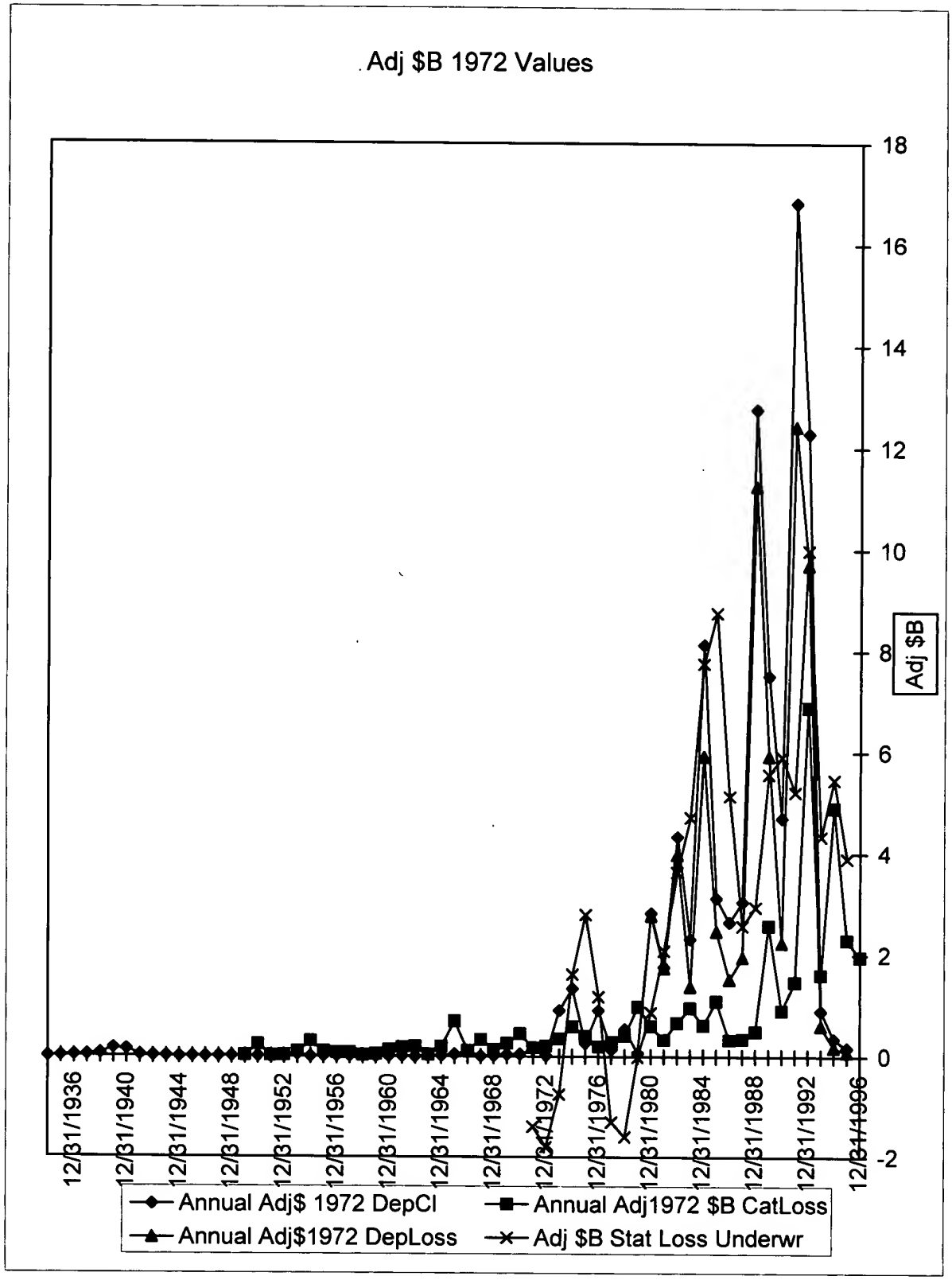

Adj $B 1972 Values
18
16
14
12
10
8
6
4
2
0
-2
Adj $B
12/31/1936
12/31/1940
12/31/1944
12/31/1948
12/31/1952
12/31/1956
12/31/1960
12/31/1964
12/31/1968
12/31/1972
12/31/1976
12/31/1980
12/31/1984
12/31/1988
12/31/1992
12/31/1996
Annual Adj$ 1972 DepCl
Annual Adj1972 $B CatLoss
Annual Adj$1972 DepLoss
Adj $B Stat Loss Underwr

Figure 51

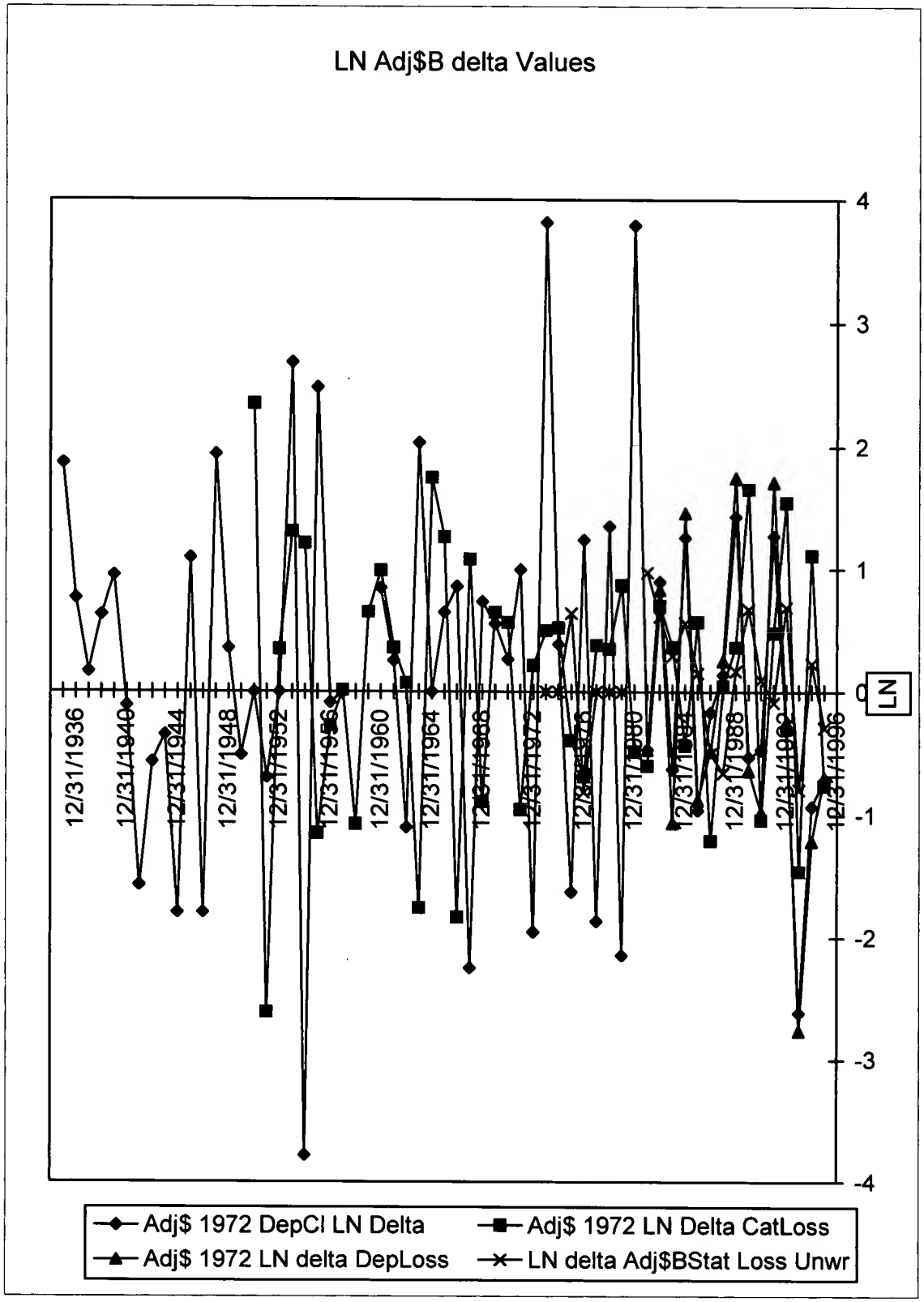

LN Adj$B delta Values
4
3
2
1
0
-1
-2
-3
-4
LN
12/31/1936
12/31/1940
12/31/1944
12/31/1948
12/31/1952
12/31/1960
12/31/1964
12/31/1972
12/31/1988
Adj$ 1972 DepCl LN Delta
Adj$ 1972 LN Delta CatLoss
Adj$ 1972 LN delta DepLoss
LN delta Adj$BStat Loss Unwr

Figure 60

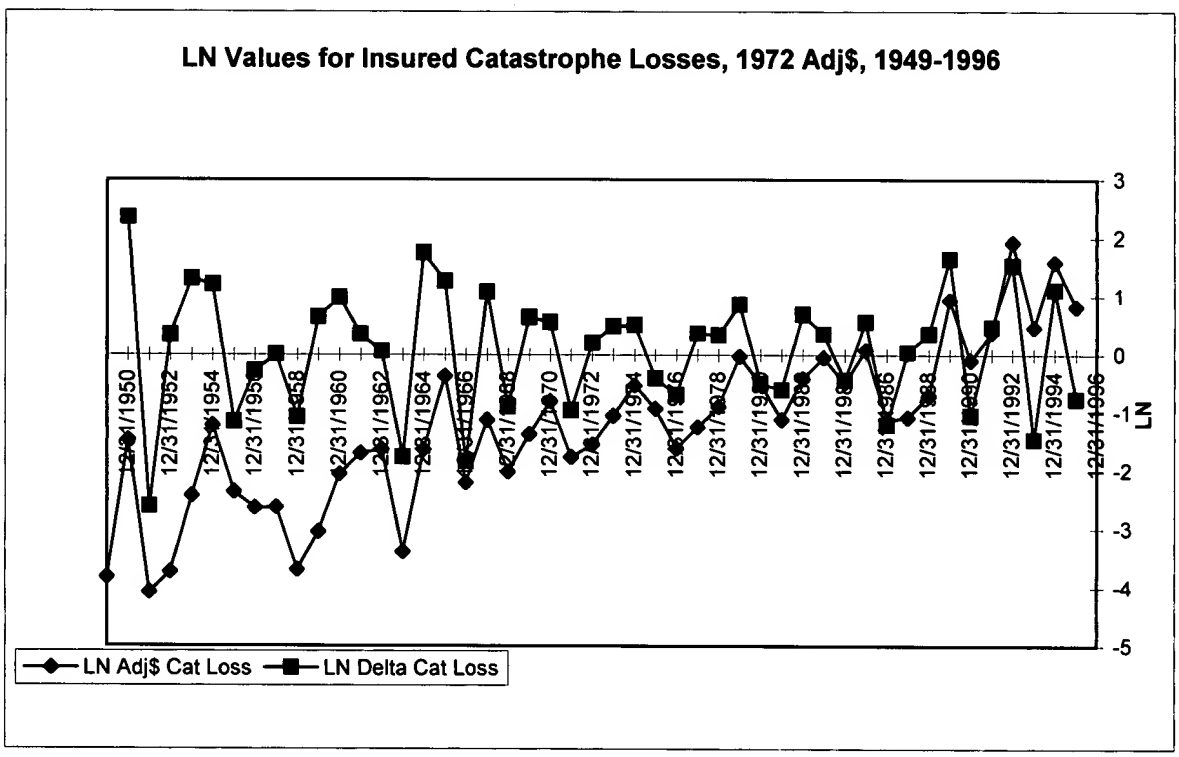


Figure 61

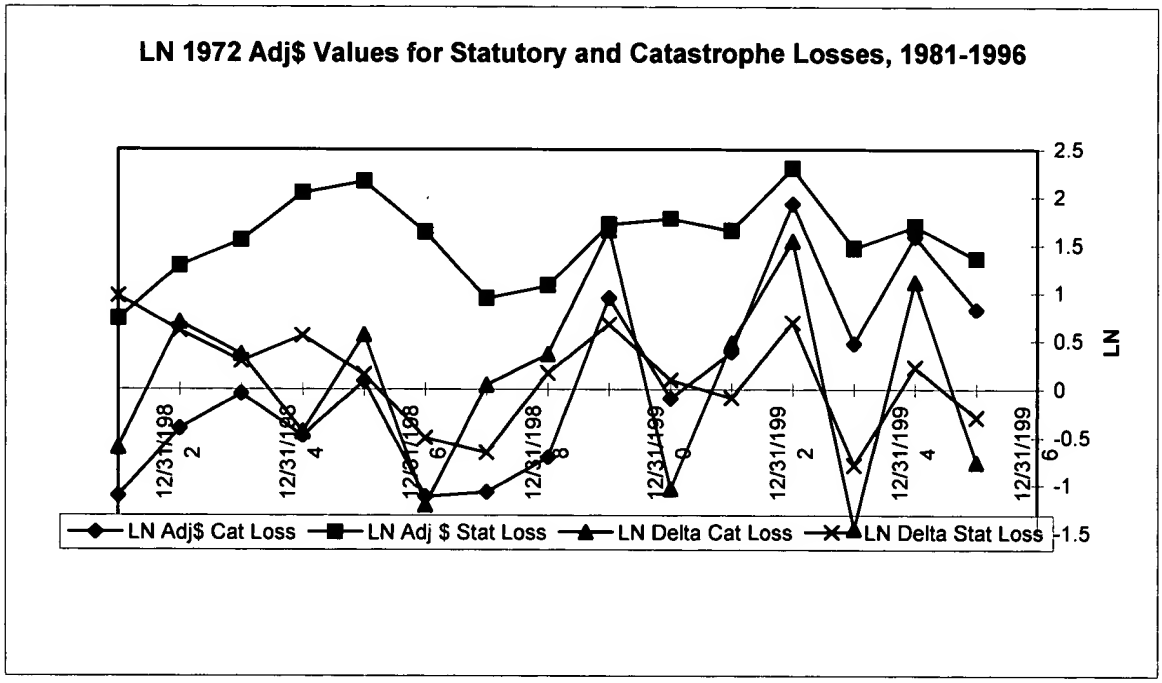


Figure 85

Descriptive Statistics of Small Samples
N=7

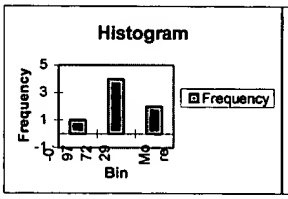
Pair A, V1		Pair A, V2		Pair B, V1		Pair B, V2	
Mean	0.450426	Mean	-0.03743	Mean	-0.24265	Mean	-0.6785
Standard E	0.56047	Standard E	0.347565	Standard E	0.214852	Standard E	0.14634
Median	-0.04875	Median	-0.36238	Median	-0.37306	Median	-0.42086
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard D	1.482863	Standard D	0.919572	Standard D	0.568446	Standard D	0.387178
Sample Va	2.198883	Sample Va	0.845612	Sample Va	0.323131	Sample Va	0.149907
Kurtosis	-0.45948	Kurtosis	1.115894	Kurtosis	2.798664	Kurtosis	-1.94966
Skewness	1.030931	Skewness	1.169931	Skewness	1.340268	Skewness	-0.6113
Range	3.886953	Range	2.722531	Range	1.816522	Range	0.89182
Minimum	-0.97723	Minimum	-1.04951	Minimum	-0.9359	Minimum	-1.2149
Maximum	2.909723	Maximum	1.673026	Maximum	0.880622	Maximum	-0.32308
Sum	3.15298	Sum	-0.26203	Sum	-1.69853	Sum	-4.74948
Count	7	Count	7	Count	7	Count	7
Confidence	1.371421	Confidence	0.850463	Confidence	0.525725	Confidence	0.35808

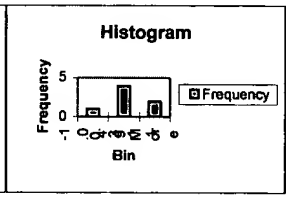
Bin	*Frequency*
-0.97723	1
0.966247	4
More	2

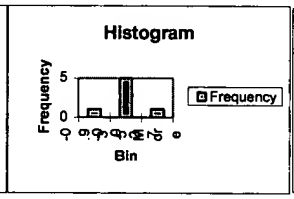
Bin	*Frequency*
-1.04951	1
0.31176	4
More	2

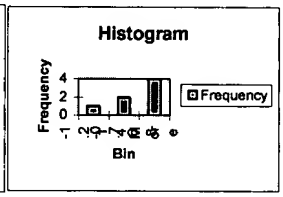
Bin	*Frequency*
-0.9359	1
-0.02764	5
More	1

Bin	*Frequency*
-1.2149	1
-0.76899	2
More	4









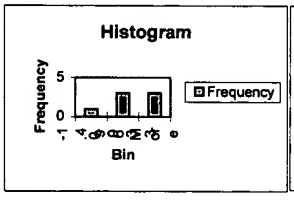
Pair C, V1		Pair C, V2		Pair D, V1		Pair D, V2	
Mean	0.027538	Mean	0.784528	Mean	-0.33035	Mean	-0.49912
Standard E	0.434807	Standard E	0.315174	Standard E	0.134676	Standard E	0.276713
Median	-0.12747	Median	0.634424	Median	-0.366	Median	-0.5937
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard D	1.150391	Standard D	0.833873	Standard D	0.35632	Standard D	0.732114
Sample Va	1.323399	Sample Va	0.695344	Sample Va	0.126964	Sample Va	0.535992
Kurtosis	-1.48493	Kurtosis	1.668062	Kurtosis	-1.42221	Kurtosis	-1.94667
Skewness	-0.06633	Skewness	1.134284	Skewness	0.403595	Skewness	-0.16976
Range	3.058596	Range	2.571371	Range	0.940578	Range	1.769019
Minimum	-1.49615	Minimum	-0.20891	Minimum	-0.75181	Minimum	-1.48422
Maximum	1.562444	Maximum	2.362462	Maximum	0.18877	Maximum	0.284799
Sum	0.192768	Sum	5.491694	Sum	-2.31247	Sum	-3.49383
Count	7	Count	7	Count	7	Count	7
Confidence	1.063935	Confidence	0.771205	Confidence	0.329541	Confidence	0.677093

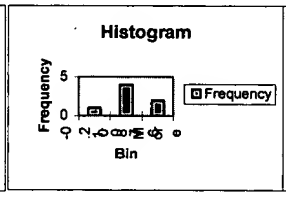
Bin	*Frequency*
-1.49615	1
0.033146	3
More	3

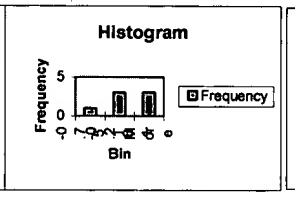
Bin	*Frequency*
-0.20891	1
1.076777	4
More	2

Bin	*Frequency*
-0.75181	1
-0.28152	3
More	3

Bin	*Frequency*
-1.48422	1
-0.59971	2
More	4







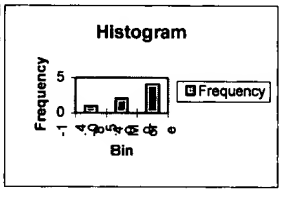
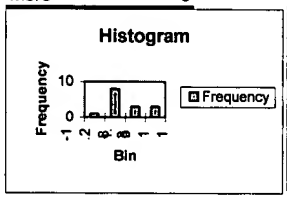


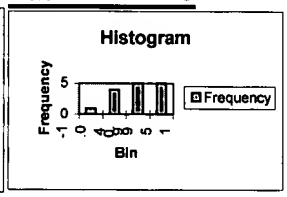
Figure 86

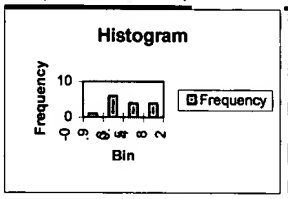
Descriptive Statistics of Small Samples
N=15

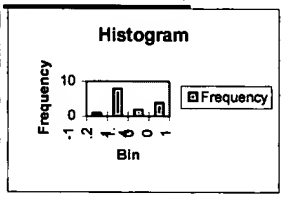
	Pair A, V1	Pair A, V2	Pair B, V1	Pair B, V2
Mean	0.053905	0.490114	0.027154	0.056505
Standard E	0.337076	0.245419	0.161223	0.299086
Median	-0.20336	0.429991	-0.03572	-0.36803
Mode	#N/A	#N/A	#N/A	#N/A
Standard D	1.305488	0.950502	0.624414	1.158353
Sample Va	1.704299	0.903455	0.389893	1.341782
Kurtosis	0.269906	-1.22001	-0.61389	-0.77163
Skewness	1.13703	0.091504	0.498485	0.836512
Range	4.193263	3.000946	2.127194	3.324581
Minimum	-1.28354	-1.04951	-0.9359	-1.2149
Maximum	2.909723	1.951441	1.191293	2.109679
Sum	0.808576	7.351706	0.407317	0.847575
Count	15	15	15	15
Confidence	0.722956	0.526371	0.34579	0.641475

Bin	Frequency	Bin	Frequency	Bin	Frequency	Bin	Frequency
-1.28354	1	-1.04951	1	-0.9359	1	-1.2149	1
0.114214	8	-0.04919	4	-0.22684	6	-0.10671	8
1.511969	3	0.951125	5	0.482229	4	1.001485	2
More	3	More	5	More	4	More	4



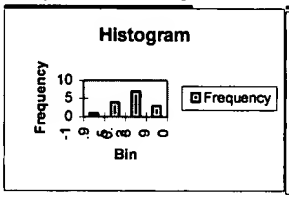


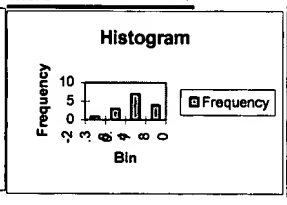


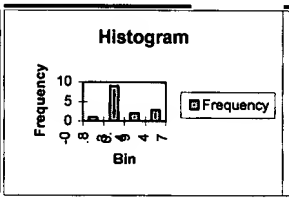


	Pair C, V1	Pair C, V2	Pair D, V1	Pair D, V2
Mean	-0.3306	0.044406	0.098899	0.054328
Standard E	0.254102	0.335159	0.211453	0.211194
Median	-0.33437	0.30914	-0.1624	0.250374
Mode	#N/A	#N/A	#N/A	#N/A
Standard D	0.984133	1.298064	0.818953	0.817952
Sample Va	0.968518	1.68497	0.670684	0.669046
Kurtosis	-0.42573	-0.33929	-0.07014	0.75619
Skewness	0.290784	-0.34152	0.960032	-0.17069
Range	3.514931	4.746622	2.673034	3.257642
Minimum	-1.95249	-2.38416	-0.83496	-1.48422
Maximum	1.562444	2.362462	1.838077	1.773422
Sum	-4.95898	0.666088	1.483486	0.814913
Count	15	15	15	15
Confidence	0.544995	0.718844	0.453522	0.452967

Bin	Frequency	Bin	Frequency	Bin	Frequency	Bin	Frequency
-1.95249	1	-2.38416	1	-0.83496	1	-1.48422	1
-0.78084	4	-0.80195	3	0.056054	9	-0.39834	3
0.390801	7	0.780255	7	0.947065	2	0.687541	9
More	3	More	4	More	3	More	2







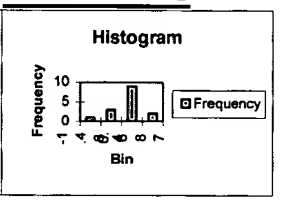
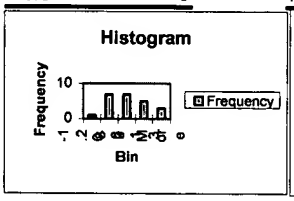


Figure 87

Descriptive Statistics of Small Samples
N=23

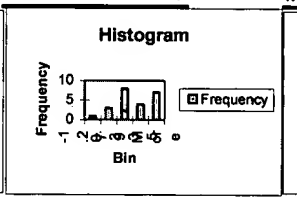
Pair A, V1	
Mean	0.295621
Standard E	0.238759
Median	0.193411
Mode	#N/A
Standard D	1.145049
Sample Va	1.311138
Kurtosis	-0.3689
Skewness	0.526621
Range	4.193263
Minimum	-1.28354
Maximum	2.909723
Sum	6.799279
Count	23
Confidence	0.495157

Bin	Frequency
-1.28354	1
-0.23522	7
0.813092	7
1.861407	5
More	3



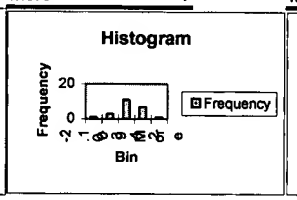
Pair A, V2	
Mean	0.433597
Standard E	0.191637
Median	0.325676
Mode	#N/A
Standard D	0.919059
Sample Va	0.844669
Kurtosis	-0.85548
Skewness	0.031131
Range	3.23093
Minimum	-1.27949
Maximum	1.951441
Sum	9.97274
Count	23
Confidence	0.397431

Bin	Frequency
-1.27949	1
-0.47176	3
0.335976	8
1.143708	4
More	7



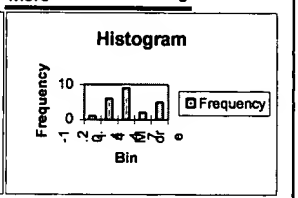
Pair B, V1	
Mean	0.057412
Standard E	0.215708
Median	0.029731
Mode	#N/A
Standard D	1.0345
Sample Va	1.07019
Kurtosis	1.374238
Skewness	0.480699
Range	4.902513
Minimum	-2.10911
Maximum	2.793407
Sum	1.320471
Count	23
Confidence	0.447352

Bin	Frequency
-2.10911	1
-0.88348	3
0.34215	11
1.567778	7
More	1



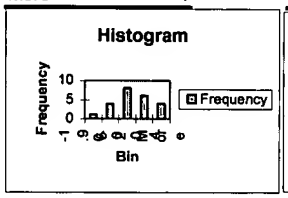
Pair B, V2	
Mean	0.145215
Standard E	0.209474
Median	-0.1493
Mode	#N/A
Standard D	1.0046
Sample Va	1.009221
Kurtosis	-0.4539
Skewness	0.729695
Range	3.324581
Minimum	-1.2149
Maximum	2.109679
Sum	3.339934
Count	23
Confidence	0.434422

Bin	Frequency
-1.2149	1
-0.38376	6
0.447388	9
1.278534	2
More	5



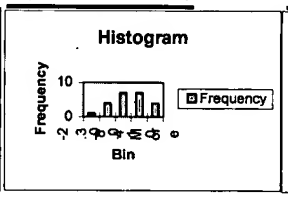
Pair C, V1	
Mean	-0.06751
Standard E	0.207896
Median	-0.017
Mode	#N/A
Standard D	0.997033
Sample Va	0.994075
Kurtosis	-0.25868
Skewness	0.19592
Range	3.914167
Minimum	-1.95249
Maximum	1.961681
Sum	-1.55264
Count	23
Confidence	0.43115

Bin	Frequency
-1.95249	1
-0.97394	4
0.004597	8
0.983139	6
More	4



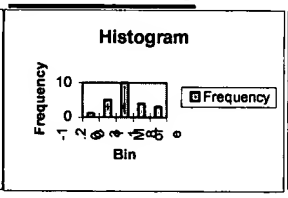
Pair C, V2	
Mean	-0.06993
Standard E	0.246672
Median	-0.09116
Mode	#N/A
Standard D	1.182995
Sample Va	1.399478
Kurtosis	-0.3547
Skewness	-0.05823
Range	4.746622
Minimum	-2.38416
Maximum	2.362462
Sum	-1.60834
Count	23
Confidence	0.511566

Bin	Frequency
-2.38416	1
-1.1975	4
-0.01085	7
1.175807	7
More	4



Pair D, V1	
Mean	0.088416
Standard E	0.170752
Median	0.033927
Mode	#N/A
Standard D	0.818899
Sample Va	0.670595
Kurtosis	-0.39191
Skewness	0.513887
Range	3.039275
Minimum	-1.2012
Maximum	1.838077
Sum	2.033562
Count	23
Confidence	0.354119

Bin	Frequency
-1.2012	1
-0.44138	5
0.318439	10
1.078258	4
More	3



Pair D, V2	
Mean	-0.08203
Standard E	0.163013
Median	0.111832
Mode	#N/A
Standard D	0.781785
Sample Va	0.611188
Kurtosis	0.205099
Skewness	0.014878
Range	3.257642
Minimum	-1.48422
Maximum	1.773422
Sum	-1.88678
Count	23
Confidence	0.33807

Bin	Frequency
-1.48422	1
-0.66981	4
0.144601	8
0.959011	9
More	1

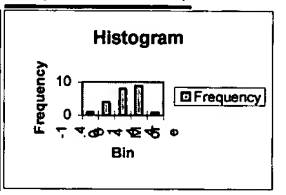


Figure 95

Temporary disable feature on memory and/or graphics, internal or as outside device, for tests

this enables the calculators to be used in test environments without further ado or loss
by having temporary disable feature, memory is not deleted, but is non-functional for tests
disable memory and/or graphics functions for a time period, so the calculator can be used:
an internal disable feature with timed duration, using the processor's clock to count time
or by central storage, memory loading, device, with storage space per calculator in group.

Figure 96

Short coded demos in on-board memory of interesting usage, topics, subjects and formulae

it's always fun for an electronic device to have simple programs, showcasing capabilities
it's always good for dedicated devices to stimulate interest and learning in their subject
the depth of features available in such calculators often remain hidden from casual use:
demos on topics, functions and formulas in memory, wherein elaboration in user manual
the user manual is organized, conceived and focused on capabilities, usage, applications
examples: reference items, formulae, even graphical art generations, sample, "Insect":
graph in polar: r1 = 5cos (2Π); r2 = 2+2cos (2θ); r3 = 5-2tan (5θ); r4 = 4+4sin (2+2θ).
add brief elaboration and context to educate, to inform; see also Reference Resources.

Figure 97

Resident resource compendia, RAM/ROM sets, providing coded functions and items on-board

not much on-board memory need be taken up by assorted demos, being fixed-coded items
by executing demos on user command, stored graphics, results or images are not required
add required list, group or function for the variety of subject expositions ala encyclopedia:
target assemblage of reference compendia to varied educational levels of math and science
high school version supports teaching of geometry, algebra, probability, calculus, sciences
elementary to college versions help educate; scaleable to lower end units, and useable in all;
make advanced specialized resources per industry, as modules loaded to RAM or installed
per electrical, mechanical, environmental, financial engineering; math, physics, astronomy
such items include today's methods, theorems, formulae, procedures, pre-coded functions
compendia add pivotal resources: references, equations, algorithms, processes, programs.

Figure 98

professional standard industry-specific software, pre-loaded or accessible through interface

develop the reference resources along with subject functions coded to existent calculators
arm a portion of calculator memory with compendium of equations, conversions, etc.
some to full pre-loading, or as modules by industry fields, with downloading to RAM

Figure 99

value-added software is packaged as desirable assets for different operational specialties

Calculator has application archives, of science, math, engineering, focus on user-friendly
proper subject archives arranged, to be categorically supplemented by newly coded items
new archives are value-added property to integrate, install, or avail, by cable, line or net
all software can be pre-loaded (opt. delete), be availed separately, or transmitted on-line
provide additional access and memory capacity, i.e. RAM/ROM cards, ext/int drive/storage
technology path of calculator unit on improved digital interfaces, bus, PCMCIA, memory.

Figure 100

Resident Financial Equations and Algorithms coded for use in Equation (iterative) Solver, include:

AI CorpB	AI TB	Annuity	Bond Equiv Yield	Bin 1, Bin2, Bin 3
Binomial	BS	Bond	BonK, BonV	Brown
CBT	CLT	Comp	Con, Conadj, Condp	Convexity
DeltaP, dP	dPdY	DurMod	DurMc	DV01
FFOTD	Forward	FX	Hedge, HR	MDS
Min1,Min2,Min3	Mortgage	MPC	Muni	OAS3 (example)
OCF	PAY, PAY1	PR, PRBond	PRCalB, PRMunat	PRO
PROMOD	PROPC	PTIC	PV	SPC
Spot	Swap	FXSwap	Tbill1, TB2,	TBT
TDCap	V	Var	W	BoxMuller

Resident Financial Reference Resource Items coded for display to screen or output, include:

Bernoulli	optionbond	Borel-Cantelli	Boundary	Brownian
Option	optionlog	CAPM	Chebychev	Correlation
CoVar	Credit	cut-off	distfunc	E(N)
EQU	EX	Floater	FOCF	GenFunc
GcS	lattice	Inde	Intre	Ito
Lambda	lease	martingale	minrisk	mpr
partition	PCP	Poisson	Portf	RandomW
replication	riskadverse	SPC	strong	theorfut
tokens	tree	utility	weak	weight

Other Reference Resource Sources for Financial Matter, Data, Equations and References, include:

Books Periodicals Newspapers Internet Real-time digitized data providers

Resident Processing, Reference Resource Items and Programmed Functions, include:

clock, date, calendar, default value present time/date
equation solver function and simultaneous equation solver function
intervals between dates, coupons, valuation, exercise, expiration
day-count conventions, instrument standards, conversions
fixed-income general valuations (annuity, mortgage, lease, bond, rates and yields)
fixed-income advanced valuations (variable cash-flows, inverse, MBS, sinking, optionality)
fixed-income derivative valuations (options, futures basis, hedge ratios, swaps, FX dP/dY)
fixed-income and derivative sensitivities (duration, convexity, delta, gamma, theta, dtheta)
fixed-income yield curve building (spot, risk-free short rates and forward curves)
accounting standards, (GAAP, statutory, derivatives, credit quality, risk-adjusted capital)
financial statement and performance ratios, operating ratios of financial criterion
credit and ratings grade conventions, calculating ratings and spread approximations
insurance ratios, pricing, quantitative methods
reinsurance forms and pricing of excess of loss, facultative, treaty varieties
actuarial mathematics and sciences, loss distributions, contingencies, survival models
standard normal and lognormal random number generation, selectable N, descriptive statistics of sample
simulations by lattice, brownian motion, random sequence generation, interpolation
portfolio management of VaR, performance analytic measures
direct approximations by derivation, linear algebra, symbolic, integration, interpolation
mapping to charts, display multiple list and graphical display (to 3D)
one, two and more variable statistics and multi-factor regression
time series and artificial intelligence data mining, normalization procedures
inferential and descriptive statistics, probability distributions
real-time and formatted data loading and serial, IRDA and TCP/IP
stored column formulas, spreadsheet capability, data set manipulation
split screen, display size minimum pixels 128x64, 8x21 display characters
trace, overlay (or by split screen) and combine scatter plots, histograms, interpolations, results.